## CLAIMS

What is claimed is:

1. A system for measuring the flow of fluid, comprising:

a flow sensing assembly, comprising:

conduit having walls for containing and transporting the fluid;

at least two heat detectors mounted at spaced positions from each other on the conduit walls and measuring the temperature of the fluid and conduit at the spaced positions;

at least two electrical power applicators mounted at different locations on the conduit and allowing electrical current to flow in the conduit walls to heat the fluid in the conduit and maintain an established temperature differential between the spaced positions;

a housing body having the flow sensing assembly contained therein;

a control mechanism for obtaining measurements of the level of power furnished to the electrical power applicators to maintain the established temperature differential between the spaced positions; and

an indicator mechanism responsive to the control mechanism providing a measure of the fluid flow rate based on the measurements obtained by the control mechanism.

2. The system of Claim 1, wherein:

the housing body is formed of conductive material.

3. The system of Claim 2, wherein:

the housing body is formed of a metal.

4. The system of Claim 3, wherein:

the metal in the housing body comprises aluminum.

5. The system of Claim 1, wherein:

a first heat detector is mounted on the conduit at a location upstream in the direction of fluid flow from the power applicators.

6. The system of Claim 1, wherein the heat applicators include first and second heat applicators mounted on the conduit at spaced positions from each other and further including:

a second heat detector is mounted on the conduit between the locations of the first and second heat applicators.

7. The system of Claim 6, wherein:

the second heater detector is mounted on the conduit midway between the locations of the first and second heat applicators.

8. The system of Claim 1, where in the conduit walls have the form of flattened ellipses in cross-section between locations where the heat applicators are mounted.

9. The system of claim 1, further including:

a heat exchanger member enclosing the conduit along at least a portion of its extent in the housing body.

10. The system of Claim 9, further including:

an insulative sleeve mounted in the housing body between the conduit and the heat exchanger member.

11. The system of Claim 1, further including:

electrical conductors connecting the heat detectors to the control mechanism; and

a terminal block on the housing body for mounting the electrical conductors therewith.

12. The system of Claim 1, wherein the heat detectors comprises thermocouples.

13. The system of Claim 12, further including:

an amplifier forming a measure of difference in temperature sensed by the heat detector thermocouples.

14. The system of Claim 1, further including:

a comparator forming a signal representative of the variation of the temperature difference measured by the heat detectors from an established temperature differential.

15. The system of Claim 1, wherein the control mechanism includes:

an adaptive response circuit forming an indication of the variation of the temperature difference.

16. The system of Claim 15, further including:

a driver circuit applying pulses of electrical current to the electrical power applicators.

17. The system of Claim 16, further including:

the adaptive response circuit providing a control signal to the driver circuit based on the variation of the temperature difference.

18. A system for controlling the flow of fluid at a measured rate of flow, comprising:

a flow sensing assembly, comprising:

a conduit having walls for containing and transporting the fluid;

at least two heat detectors mounted at spaced positions from each other on the conduit walls and measuring the temperature of the fluid and conduit at the spaced positions;

at least two electrical power applicators mounted on the conduit and allowing electrical current to flow in the conduit walls to heat the fluid in the conduit at and maintain an established temperature differential;

a housing body having the flow sensing assembly contained therein;

a control mechanism for obtaining measurements of the amount of energy furnished to the heat applicators to the established temperature differential between the spaced positions;

an indicator mechanism responsive to the control mechanism providing a measure of the fluid flow rate based on the measurements obtained by the control mechanism; and

a flow regulating valve responsive to the measure of the fluid flow rate to control the flow of fluid in the conduit.

19. A system for measuring the flow of fluid in a conduit, comprising:

at least two heat detectors mounted at spaced positions from each other on the conduit measuring the temperature of the fluid and conduit at the spaced positions;

an amplifier forming a measure of difference in temperature sensed by the heat detectors;

a comparator forming a signal representative of the variation of the temperature difference measured by the heat detectors from an established temperature differential;

at least two electrical power applicators mounted at different locations on the conduit and allowing electrical current to flow in the conduit walls to heat the fluid in the conduit and maintain an established temperature differential between the spaced positions;

a control mechanism for obtaining measurements of the level of electrical power furnished to the power applicators to maintain the established temperature differential between the spaced positions; and

an indicator mechanism responsive to the control mechanism providing a measure of the fluid flow rate based on the measurements obtained by the control mechanism.

20. The system of Claim 1, wherein the control mechanism includes:

an adaptive response circuit forming an indication of the variation of the temperature difference.

21. The system of Claim 15, further including:

a driver circuit applying pulses of electrical current to the electrical power applicators.

22. The system of Claim 16, further including:

the adaptive response circuit providing a control signal to the driver circuit based on the variation of the temperature difference.